

ABSTRACT

The metal film of the present invention is a dense film of a single crystal that has very low surface roughness and very good crystal orientation because an arithmetic mean roughness of the surface is not larger than 2 nm and a (111) peak intensity of X-ray diffraction is not less than 20 times the sum of all other peaks. Also the metal oxide film of the present invention is a dense film that includes less oxygen defects and almost no voids therein because a content of a non-oxidized metal is not higher than 1 mole % of a metal component that constitutes the metal oxide and a packing density is 0.98 or higher.

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